

# Regulating Over-the-Top Service Providers in Two-Sided Content Markets: Insights from the Economic Literature

Jan KRÄMER & Michael WOHLFARTH

University of Passau, Chair of internet and Telecommunications Business

**Abstract:** In this paper we scrutinize the request to regulate access to the OTTs' essential services bottleneck based on insights from the economic literature. First, we delineate that OTTs may pursue a one-sided or two-sided business model, which makes a fundamental difference with respect to the underlying economics. Focusing on two-sided content markets, we then discuss three scenarios that differ in the degree of competition that OTTs may face, ranging from potential competition over access-based competition (via access regulation) to actual platform competition. Although access regulation may have merits, it is very questionable whether such regulation should be pursued due to a high uncertainty concerning the economic benefits and necessity as well as practical legal problems.

**Key words:** over-the-top services, two-sided markets, access regulation, telecommunications, internet.

The market for telecommunications services is changing rapidly and a myriad of new players is successfully deploying new and innovative services, which are widely adopted by the consumers. Especially the emergence of "Over-the-Top Services" (OTTs), which generally do not own an extensive infrastructure, but rather use the existing infrastructure of traditional telecommunications service providers (telcos) has led to disruptions in the traditional internet ecosystem. In an effort to establish a level playing field between OTTs and vertically integrated telcos, it has been asked whether dominant OTTs should be regulated in a similar fashion to dominant telcos (BROWN, 2014; European Commission, 2015, p.55; THOMAS, 2015). Another option to establish the demanded level playing field can be seen in the deregulation of telcos. However, there remains considerable doubt whether (level) competition between telcos and OTTs will resolve the pertinent market failures that arise in such markets (PEITZ *et. al.*, 2014), and thus, we will not explicitly cover the approach in this paper. On the contrary, it is argued that some OTTs offer essential services, which enables them to control access to customers similar to the way telcos

control "essential facilities", just at a higher level of the internet value chain (GABRIEL, 2015). We therefore scrutinize the request to regulate access to the OTTs' essential service bottleneck based on insights from the economic literature and thereby make two key contributions: First, we highlight that OTTs cannot be subsumed under the same roof as they pursue various business models and have very different requirements with respect to the underlying infrastructure. In particular, we delineate that OTTs may pursue a one-sided or two-sided business model, which makes a fundamental difference with respect to the underlying economics. Although not all currently relevant OTTs employ a two-sided business model (HAGIU & WRIGHT, forthcoming), we focus on these players because the economic basis for regulation as well as the potential impact of regulation is less clear. Second, we discuss the necessity and likely impact of access regulation of two-sided OTTs on market outcome. To this end, we consider three scenarios that differ in the degree of competition that OTTs face, ranging from potential competition over access-based competition (via access regulation) to actual platform competition. In particular, we show that whereas infrastructure-based competition is considered to be the silver bullet for increasing static and dynamic efficiency in traditional telecommunications markets (KRÄMER & SCHNURR, 2014), the effect of competition on the efficiency of two-sided market platforms is not as clear cut. It therefore seems rather questionable if the traditional mantra of fostering competition should be adapted without strictly considering the properties of the respective OTT market.

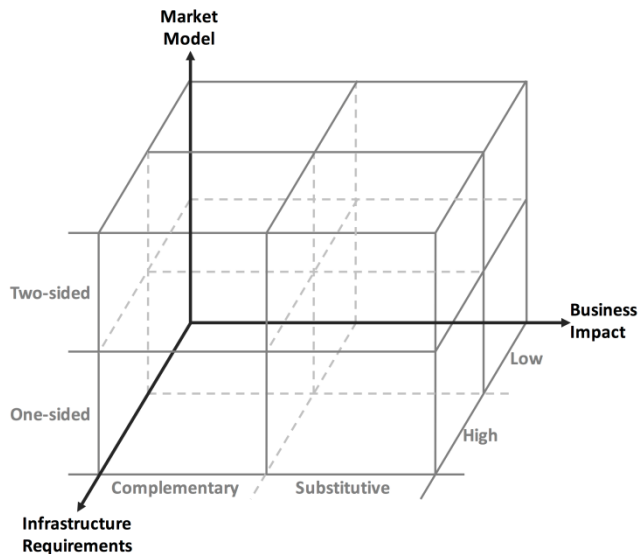
The remainder of this article is organized as follows. The next Section develops a framework helping to identify the occurring problems between OTTs and traditional telcos. The following Section considers the economic key principles of bottlenecks constituted by one-sided telecommunications and two-sided content markets. In the 4th Section, the necessity and impact of access regulation will be discussed in the light of three different market scenarios. The last Section concludes with a brief summary and directions for future research.

## ■ A framework for characterizing the relationship between OTTs and telcos

OTT services are complementary or substitutive applications building upon the existing, physical infrastructure of the internet, but are not offered

by the telecommunications providers themselves – the OTT provider consequently has *ex ante* no relationship to the customer, nor does it have control over the customer access network. Therefore, OTTs rely to a large extent on the correct and fast transmission of data by telecommunications service providers to be able to offer their services. The offerings of OTTs have a variety of implications on existing players within the ecosystem of the internet as the services can be substitutive and create a kind of "business stealing effect" (BROOS & GAUTIER, 2015, p. 1) or complementary so that they might enhance the perceived attractiveness of being connected to the internet or servicing ISP. Therefore, a "schizophrenic relationship" (COX *et al.*, 2015, p. 1) evolves. In an effort to delineate this relationship further, Figure 1 proposes a framework by which OTTs can be characterized along three key dimensions: (1) The nature of the OTT's chosen market model (one-sided or two-sided), (2) the immediate business impact of the OTT's service on the services currently offered by the telco (substitutive or complementary) and (3) the infrastructure requirements by OTTs (high or low).

**Figure 1 - A framework characterizing the relationship between OTTs and telcos**



The first dimension is given by the used market model of the respective OTT. Roughly speaking, the market can be divided into those active in a one- and those active in a two- or multi-sided business model. As will be discussed below, this realization is notably important as the resulting

economic principles differ significantly. Especially as the implications according to price setting and expressiveness of traditional antitrust measures differ (WRIGHT, 2004; EVANS & SCHMALENSEE, 2013), comparing known regulatory remedies from a one-sided logic to OTTs active in a two-sided market should not occur hastily. Although not all currently relevant OTTs employ a two-sided business model (cf. Hagiu and Wright, forthcoming), we focus on these players because here the economic basis for regulation as well as the potential impact of regulation is less clear.

The academic investigation of two-sided markets is rather young (ROCHET & TIROLE, 2003; PARKER & VAN ALSTYNE, 2005; CAILLAUD & JULLIEN, 2003), but still vibrant. Two-sided markets are characterized by the fact that the service provider (a.k.a. the platform operator or intermediary) facilitates transactions between two distinct groups (e.g., buyers/sellers, viewers/advertisers), by bringing them together on its platform. The defining feature of two-sided markets is that "the volume of transactions [can be affected] by charging more to one side of the market and reducing the price paid by the other side" (ROCHET & TIROLE, 2006, p. 664f), usually due to the presence of cross-side network externalities. The resulting price structure in a two-sided market is thus determined by the relative strength of cross-group externalities, the chosen pricing elements (fixed fees and/or per-transaction charges) and the possibility of single and multi-homing (ARMSTRONG, 2006, pp. 668ff), i.e., whether one side of the market can join more than one platform. The diverting economic implications of one-sided and two-sided market forms can particularly be seen regarding the profit-maximizing price setting: Setting a zero price for consumers (e.g., services supported by advertising) may be profit maximizing in a two-sided market context, because it is balanced by higher prices on the other market side (e.g., the advertising market). This stands in sharp contrast to one-sided market models, which need to set the prices above zero for consumers in order to recover costs (e.g., licensing costs).

Whether a service provider wants to act as an intermediary, thus operating a two-sided market model (e.g., Ebay, Google Search, Facebook, Youtube as well as almost all other advertisement-supported free services) or as its own service provider, thus operating a one-sided market model (e.g., Netflix, WhatsApp) is usually a deliberate choice of the respective firm. For example, HAGIU & WRIGHT (2015, forthcoming) highlight the key trade-offs involved in deciding on the appropriate market form. This is exemplified by the fact that various firms use different market models simultaneously, albeit for different services. For instance, Apple functioning as (one-sided) reseller with respect to the iTunes Store (acquiring music licenses and

selling music on its own behalf) and Apple functioning as a two-sided platform with respect to the AppStore (demanding a per-transaction fee for bringing app users and developers together). Moreover, the market model is not prescribed by the type of service that OTTs offer. For example, video streaming services may either be provided as a one-sided market model (e.g., subscription-based Netflix), or as a two-sided market model (e.g., advertisement-based Youtube).

Concerning the second dimension, a distinction can be made with respect to the impact of the OTT's service on the telco's business. In particular, those OTT services that offer communications services (e.g., WhatsApp, Facebook, Skype) or in the case of cable operators also video services (e.g., Netflix, Hulu) which are substituting services traditionally offered by integrated telcos, whereas the myriad of remaining services and applications (e.g., information services) are complementary to existing offerings of telcos. Evidently, substitutive services lead to stronger competition and challenge telcos' traditional revenue streams, whereas complementary services contribute to a consumer's higher valuation of the commodified internet access and are thus supporting the generation of revenues for telcos (PEITZ *et al.*, 2014). The stated dichotomy is also closely related to current investigations concerning the debate of net neutrality (KRÄMER *et al.*, 2013) as it highlights the evolving question of exclusion or promotion of (own) services (BRITO *et al.*, 2014; BROOS & GAUTIER, 2015; DEWENTER & RÖSCH, 2014). Although the resulting classification seems clear cut, it has to be stated that currently complementary services might become substitutes in the future as integrated telcos augment their own service portfolio (e.g., by video or music streaming services in the case of fixed-line operators).

The third relevant dimension is given by the infrastructural requirements of OTTs with respect to the underlying data transmission network. Several OTTs offer high definition media content (e.g., YouTube, Netflix) and real-time applications (e.g., video conferencing via Skype) that have high requirements on transmission capacity and latency and force telcos to invest in their networks. As stated by SANDVINE (2014) "Real-Time Entertainment" induces the majority of traffic in peak times – an issue also underpinned by ETNO (2012). Even though network operators and access providers might already plan to increase bandwidth, the "data volumes are increasing much faster than the infrastructure needed to carry it" (TOURÉ, 2012). Additionally, services offering real-time voice or video communication rely on a fast and reliable infrastructure to be able to offer a good Quality-of-Experience although the traffic consumption is less prominent. It is clear that

telcos criticize particularly those OTTs that have high infrastructure requirements for "free riding" on their infrastructure.

## ■ Comparing economic key principles along the ICT value chain

It should be evident by now that telcos follow a one-sided business model in offering the internet access service. For providing this service, access to the customer access network (the "last mile" network) is necessary, which is owned and controlled by the telcos. The customer access network therefore constitutes an "essential facility". In an effort to increase the efficiency of the internet access market, dominant telcos in Europe are subject to access regulation, which requires them to provide access to the essential facility to competitors. However, the effect of access regulation on dynamic efficiency, which was suggested to be positive in the "ladder of investment" theory (CAVE, 2006), remains unclear to date. For example, on the one hand, the empirical papers by GRAJEK & RÖLLER (2012) as well as BACACHE *et al.* (2014) <sup>1</sup> found the dynamic effect to be negative or non-existent. On the other hand, NARDOTTO *et al.* (2015) show that access regulation has increased the quality of broadband, although not the diffusion of broadband. One can reasonably argue, however, that access regulation has increased static efficiency.

Without doubt, dominant market players also exist at higher levels of the internet value chain. Several OTTs, particularly those pursuing two-sided market models, are *de facto* monopolists or enjoy at least market shares well above 40% (a sufficient criterion for a dominant position according to European law) for the service that they offer (e.g., Facebook, Google Search, eBay, Youtube). These OTTs operate a proprietary virtual network comprised of consumers and data, which (particularly in the context of a two-sided market) is characterized by positive feedback loops that tend to grow large networks even bigger and make entry for alternative providers even harder. It can thus be argued that access to consumers or data in these virtual networks constitutes an "essential service" at the software level to which access should be regulated in a similar manner as to "essential facilities" at the infrastructure level. For example, this could be achieved by

---

<sup>1</sup> BACACHE *et al.* (2014) do find weak support for a shortened ladder, i.e., unbundling instead of duplicated lines represent the last rung.

granting competitors access to customer databases (e.g. ratings at eBay or search profiles at Google) in an effort to enable alternative providers (e.g. Ricardo auction or Microsoft Bing) to tailor competitive services.

In order to lay the basis for an informed discussion on whether access regulation of OTTs is necessary and reasonable, we now highlight the key differences between one-sided infrastructure markets (as constituted by the telcos' internet access service) and two-sided content markets (as constituted by many OTTs' information services). For the sake of clarity, we base our comparison on monopolistic markets, which is true in the limit and serves as a means to highlight the effect of market power. Table 1 organizes this discussion.

**Table 1 - Comparison of economic key principles of one- and two-sided markets along the ICT value chain**

|                             | <i>One-sided monopoly<br/>(traditional telco)</i> | <i>Two-sided monopoly<br/>(OTT)</i>                                      |
|-----------------------------|---|--|
| Type of bottleneck          | Physical infrastructure                           | Virtual network (data, proprietary networks & participants)              |
| Emergence of the bottleneck | Historic as a result of privatization             | New business models, innovative services, possibly locational advantages |
| Delimitation of the market  | Bound to geographic area; "relocation" impossible | International, reorientation principally possible                        |
| Investment requirements     | Rather high                                       | Rather low   |
| Function                    | (Re-) Seller                                      | Intermediary   |
| Network effects             | Direct  | Mostly Indirect & Internalized   |
| Pricing                     | Profit maximization ( $p > MC$ )                  | Profit-maximizing balance ( $p \geq / < MC$ )                            |
| Allocative efficiency       | Unlikely (Dead-weight loss)                       | Potentially  |

The emergence of traditional infrastructure bottlenecks can be seen as result out of a historical coincidence. Due to the privatization of former state-provided facilities without a second fixed-line infrastructure, e.g., to avoid technological heterogeneity or incompatibilities, a dominant position was passed to one provider's possession and consequently set under regulatory supervision. The dominant position thus evolved immediately and cannot be classified as a result of a competitive process. In contrast, the foundation of the emergence of an OTTs' bottleneck can be seen in the provision of new and innovative services (HOUCK, 2011; LI & WHALLEY, 2002), although the existence of network effects and softer data privacy obligations in some countries might be seen as supportive to establish a flourishing OTT service.

Another interesting point is the market delimitation. Although the business activities of both may have an international focus, the operated bottleneck of traditional telcos is bound to a certain geographic region, leading to a high dependence on political decisions as they have no possibility to transfer their assets to another market without making scuttling financial losses. Moreover, telcos have to maintain and (costly) upgrade their physical elements in order to serve political and customer needs (European Commission, 2015). As we will discuss below, OTTs contrarily may have lower investment necessities considering the physical infrastructure as server capacity can be dynamically scaled. Additionally, the limited focus is partly vanishing because of the virtual nature of the established bottleneck. New laws or obligations certainly concern also these players and part of their business activity might be harmed substantially, but as many OTT players are already acting globally and have improved algorithms or processes to address specific business problems, a relocation or retraction from a certain market seems possible without losing all of the companies' value (e.g., intellectual property). An example might be given considering Google with its news service leaving the Spanish market due to a new jurisdiction. Although Google News is not necessarily a monopoly or bottleneck, it nevertheless shows that there might be differences according to possibilities to react on concrete jurisdiction as leaving a delimited market seems a far more realistic scenario for OTTs than for providers of a physical infrastructure.

As detailed above, many dominant OTTs (but not all) pursue a two-sided market model, i.e., they act as an intermediary rather than as a (re-)seller. This relates also to the type of network effects that characterize the two markets. Whereas traditional telecommunications markets are predominantly characterized by direct network effects (i.e., the value of the network for consumers increases directly as more consumers join the network), two-sided content markets are additionally characterized usually by even stronger indirect network effects, i.e., the value of the network increases particularly for the other market side as more consumers join the network.

Building on the previous discussion, the price structure in two-sided markets is more complex than in one-sided markets. For example, following ROCHET & TIROLE (2006) a formula very similar to the traditional Lerner Index can be derived if only transaction fees and no fixed costs or benefits are considered. Using the equilibrium relationship that the effect of profits through increased prices on the buyer's side equals the effect through higher prices on the seller's side (i.e.,  $\frac{p^i}{\varepsilon^i} = \frac{p^j}{\varepsilon^j}$ , if the two market sides are indicated by  $i$  and  $j$ , cf. EVANS, 2011), the cost in the one-sided Lerner formula now

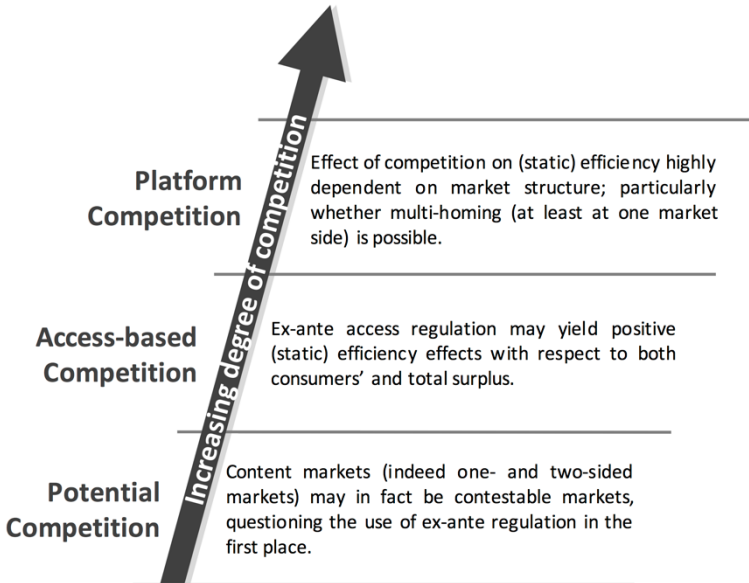


matches a kind of opportunity cost, i.e.  $\frac{p^i}{\varepsilon^i} = \frac{p^j}{\varepsilon^j} = \frac{1}{\varepsilon^i}$ . Increasing the price on side  $i$  therefore leads to the necessity to compensate the costs through the prices on side  $j$ . Considering only membership fees, an additional participant on side  $i$  increases the surplus on side  $j$  so that the price can be increased on that side without losing a customer (ROCHET & TIROLE, 2006). Taking into account the positive externalities and internalizing these effects hence leads to reduced prices on each side compared to a one-sided monopoly. In other words, the internalization of external effects to balance both market sides simultaneously is likely to result in a welfare-wise beneficial situation (HAGIU, 2004), although a monopoly markup is present. Interestingly, the structure of the resulting prices can be in line with the ones of a maximization of social welfare (HAGIU, 2004), i.e., lead to allocative (static) efficiency. This is in contrast to the profit-maximizing price setting behavior of an unconstrained one-sided monopolist unable to perfectly discriminate, which will yield a dead weight loss, i.e., allocative inefficiency due to too high prices (JOSKOW, 2007).

## ■ Effects and preconditions of regulatory remedies in two-sided content markets

With regard to the European regulatory framework, PEITZ *et al.* (2014) state that OTTs can be treated as an Electronic Communication Service (see Directive 2002/21/EC Article 2c), which implies additional regulatory obligations. But as the classification depends on whether the service produces or provides content, an investigation necessitates a decision made on a case-by-case basis (PEITZ *et al.*, 2014). BROWN (2014) respectively highlights that (communication-) OTTs are a "regulatory hybrid" fitting neither into the classification as Electronic Communications Service nor into the classification as Information Society Service - see Directive 98/34/EC Article 1(2). While a complete judicial consideration is out of the scope of this paper, the remainder of this paper will concentrate on the likely impact of access regulation of two-sided OTTs on market outcome. Herein three different scenarios to increase competition will be discussed, which differ in the degree of competition that OTTs face (cf. Figure 2).

**Figure 2 - Static efficiency in two-sided markets under various degrees of competition**



## ■ Potential competition

A key question concerning the necessity to regulate dominant OTTs in the first place concerns the existence of a contestable market (BAUMOL, 1982). Especially if content markets are not characterized by high sunk costs, which would otherwise effectively prevent market entry and exit, the potential competition by an outside firm, ready to step into the market and able to replace the current incumbent, in case the incumbent abuses its market power, may effectively discipline the incumbent and could make regulation superfluous (JOSKOW, 2007). Contestability can be easily dismissed for traditional infrastructure bottlenecks, as the local loop is characterized by high sunk costs.

However, it is debatable whether contestability is warranted for OTTs. On the one hand, empirical evidence suggests that contestability exists as previously dominant search engines were successfully replaced by the newcomer Google (HAUCAP & HEIMESHOF, 2014). In this particular case, the successful entry of the newcomer was certainly facilitated by the possibility to easily multi-home OTT services (DOGANOGLU & WRIGHT,

2010). In this way, competing services (e.g., search engines) can be tested and used in parallel without much effort. Moreover, it can be argued that sunk costs are relatively low for OTT services and mainly constituted by intellectual and human resources required to set up a new service. Although, from a more technical view, it will require immense server capacities to compete against the Googles or Amazons (NEWMAN, 2014), such capacities can also be leased and dynamically scaled in the cloud, enabling to circumvent initial high fixed costs until the viability of the business model is proven. Additionally, server capacities are not bound to a certain business concept, i.e., can be used for a myriad of applications. Thus, based on this view contestability seems feasible.

On the other hand, the duplication of an "essential service" might still not be viable for a direct competitor due to acquired learning advantages (e.g., improved algorithms) and a large data and customer basis, which might constitute an effective barrier to entry (ARGENTON & PRÜFER, 2012). This can especially be seen with regard to advertisement-supported two-sided business models, where customer data may be exploited to display more relevant (i.e., targeted) advertisements, which is not only valued by advertisers and thus the intermediary (hypothetically more sales and clicks), but possibly also by the customers themselves. This may result in self-strengthening effects, leading to a higher valuation of advertisers (i.e., higher costs per click) for platforms with many users and a variety of services (NEWMAN, 2014). This can also be seen at non-advertisement based two-sided platforms whereby the significance of a large user base gets even more important as indirect network effects may guard the intermediary since, in the case of app stores, many users are attractive for developers and *vice versa*.

Whether such incumbency advantages are indeed insurmountable is subject to debate as some argue that the benefits from data availability increase with a declining marginal rate (OCELLO *et al.*, 2015). Moreover, currently several independent dominant OTTs exist (e.g., Google, Facebook, Microsoft), which all have access to a similar customer data basis and may therefore be able to readily enter each other's service portfolio. For example, ARGENTON & PRÜFER (2012) argue that although raw data may be available to several players, context-dependent data may be a source for competitive advantages.

Finally, OTTs may shield their services from entry by offering a bouquet of services for customers somehow linked together, which in sum makes multi-homing less attractive for customers. This may even lead to the

attempt to leverage market power from one content market to another, for example by tying the use of one service to another. This strategy might be exemplified by Google, which does not only offer a set of interoperable services, but also seeks to tie its (principally open-source) Android operating system to its (proprietary) Google services in order to foreclose new entrants (EDELMAN, forthcoming).

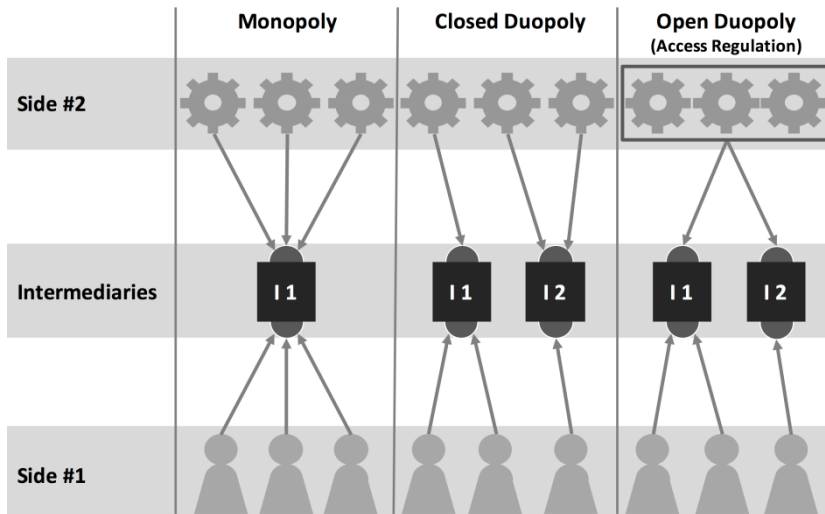
In summary, contestability of two-sided content markets cannot be as clearly dismissed as for infrastructure markets and may indeed be viable. In any case, considering the potentially negative effects of *ex ante* regulation on dynamic efficiency, it is very questionable whether a need for regulation of dominant OTT services can be based on the existence of a lack of contestability. Notwithstanding, *ex post* remedies following the abuse of a dominant position may very well apply.

## ■ Access-based competition

But what if, irrespective of legal reason, *ex ante* access regulation would nevertheless be applied to two-sided content OTTs? We will consider the effects of opening parts of the two-sided bottleneck so that one market side (e.g., the proprietary customer database) is accessible for other (potentially new) intermediaries. On this basis access-based competition could evolve. VERDIER (2013) studies the case of granting access to an entrant on one market side so that the monopolistic feature of the intermediary is still present. Rigorous economic analysis of access-based competition with competing intermediaries in the context of (two-sided) OTTs is scarce. An exception is the model by SCHIFF (2003), which for the time being, will serve as the foundation for the subsequent discussion.

SCHIFF (2003) considers so-called open two-sided systems, which (are forced to) share at least the data of one side of the market (e.g., the customer data base, but not the advertiser data base). In comparison, a closed system relates to the classic case of two-sided platform competition, where participants on each side are exclusively available at one platform. SCHIFF (2003) studies both modes of competition and compares them to the outcome when only a single monopolistic platform is available. All three scenarios are depicted in Figure 3.

Figure 3 - Two-sided market scenarios considered by SCHIFF (2003).



SCHIFF (2003) shows that with respect to total welfare (sum of producers' and consumers' surplus) as well as consumers' surplus an open duopoly is socially preferable over a monopoly, which is preferable over a closed duopoly. This result is driven by the positive network effects from a joint customer basis, which always increases consumers' surplus. It must be noted, however, that zero costs for providing access are assumed.

That is, even in the monopoly case the internalization of externalities outweighs the increase in prices so that consumers prefer this scenario over a closed duopoly, although the resulting prices are at least as high as in the closed duopoly scenario. Interestingly, the intermediary's achievable profit is at least as high in an open system as in a closed system. This is because each intermediary in an open system has less incentive to lower prices than in a closed system, because in an open system the benefits of an increased customer basis accrue at both intermediaries and not just one. This effect leads to a "weakened competition under open duopoly compared with closed duopoly" (SCHIFF, 2003, p. 437). Additionally, platforms in an open system are likely to merge so that a monopoly might occur. Although the firms benefit, the customers are worse off and total welfare is decreased. Therefore, potential mergers should be strictly observed.

In summary, the model of SCHIFF (2003) highlights two interesting aspects for the *ex ante* regulation of access to OTTs. First, access regulation may in fact weaken competition, although the network benefit

thereby increases, which yields higher consumer and total surplus. Second, if access regulation cannot be achieved (e.g., due to legal concerns of data sharing) a two-sided content monopoly may after all be more efficient than the competition of closed platforms. This latter aspect will be considered in more detail next.

### **Platform competition**

Whereas in the case of traditional telco markets, infrastructure-based competition is considered to be the silver bullet for increasing static and dynamic efficiency (KRÄMER & SCHNURR, 2014), the competition between two-sided market platforms may even be detrimental to welfare, because competition hinders the internalization of indirect network effects at each platform (HAGIU, 2006). On the other hand, it can be argued that when a competing platform reduces the prices on the buyer's side, not only new buyers are attracted from the other platform, but also new sellers as the declining amount of buyers reduces the attractiveness of the other platform (RYSMAN, 2009). Thus, competition may nevertheless have an important impact on the market outcome by disciplining the price setting behavior of the firms. Over and beyond the model by SCHIFF (2003), the overall effects of competition between two-sided market platforms therefore seem rather ambiguous and highly dependent on the respective market structure (e.g. whether multi or single-homing is possible), the relative strength of network effects compared to the degree of competition between platforms and the possibilities of market entry. We exemplify this point in the following by means of several theoretical studies.

CAILLAUD & JULLIEN (2003) consider a model of competing closed two-sided market platforms, where each market side can only participate at exactly one platform, i.e., both sides single-home. Moreover, the platforms provide essentially the same service and thus competition is relatively strong. This situation holds, for example, if we assume that consumers use either Google Search or Microsoft Bing, but never both, and that advertisers also choose to advertise at only one of the two search engines. The key message of this paper then is that the (search engine) market will converge to a single monopolistic platform. Interestingly, this situation is efficient, because the incumbent must price very low in order to secure this monopoly, such that all surplus is transferred to the market participants on each market side, while the incumbent does not make any profits. Thus, the monopolistic firm behaves exactly as in a contestable market: Although it enjoys 100% of

the market share, it does not have any market power. This underlines the importance to distinguish between market power and market share.

ARMSTRONG (2006) also considers competing closed platforms, but allows one side to multi-home (e.g., app developers are available on both platforms whereas app consumers use only one platform; advertisers are active on both platforms, but users are not). This has a tremendous effect on the market outcome. Now the single-homing side becomes more important as it constitutes a competitive bottleneck, leading to strong competition between platforms at this market side (e.g., consumers), whereas competition is weakened on the other market side (e.g., app developers, advertisers), leading to excessive prices. The outcome is likely to be inefficient, because the single-homing side enjoys higher than optimal benefits at the costs of the multi-homing side, which in turn leads to less than efficient participation at the multi-homing side (e.g., too few available apps).

Further, ARMSTRONG & WRIGHT (2007) show that in the model of ARMSTRONG (2006), the multi-homing side can retain some of its surplus by agreeing to single-home (e.g., app developers produce apps exclusively for one platform). Of course, this will reduce the surplus of the single-homing side compared to the model of ARMSTRONG (2006).

Finally, DOGANOGLU & WRIGHT (2010) consider a two-stage game, where an incumbent two-sided market is challenged by a potential entrant. The entrant offers a service that exhibits stronger network effects than that of the incumbent, i.e., a "better" service. The authors find that the entrant can efficiently take over the market only if consumers are able to multi-home. However, if the incumbent can ensure single-homing (e.g., through exclusivity contracts or high switching costs), then the outcome is likely to be an inefficient lock-in with the incumbent monopoly.

Thus, the paradox lesson from these papers is that i) in the case of single-homing, competition between homogenous platforms is likely to lead to a re-monopolization, which however, is efficient, or ii) in the case of multi-homing, platform competition can have pro-competitive effects for the single-homing side (usually the consumers), although the overall outcome is likely to be inefficient. Nevertheless, multi-homing may also be a necessity to ensure that inefficient monopolies can eventually be superseded.

## ■ Conclusions and directions for future research

In this paper, we have presented some of the basic economic principles that govern two-sided content markets and highlighted how these can inform the discussion on whether dominant two-sided OTTs should be *ex ante* regulated, e.g., by providing competitors access to essential data on customers or otherwise ensuring interoperability. In particular, we have discussed that:

- content markets (indeed one and two-sided markets) may in fact be contestable markets, questioning the use of *ex ante* regulation in the first place;
- *ex ante* access regulation of two-sided content markets may nevertheless yield positive (static) efficiency effects with respect to both consumers' and total surplus;
- the effect of competition between competing two-sided market platforms on (static) efficiency is highly dependent on the market structure and in particular whether at least one market side is able to multi-home.

Overall, our theoretical investigation shows that *ex ante* (access) regulation of two-sided content markets should not occur hastily as the benefits and even the necessity of such an intervention is very questionable. Especially by considering access regulation, several practical legal problems arise in the context of two-sided content markets. First, granting access to databases naturally raises concerns of data protection, privacy, as well as intellectual property rights. Second, a prerequisite for *ex ante* regulation is to establish that there exists in fact significant market power in the relevant market. However, traditional means to assess market power, such as the SSNIP test or the Lerner Index cannot be applied (EVANS, 2011; FILISTRUCCHI, 2008). In a two-sided market neither zero prices nor very high prices signify abusive or anti-competitive behavior. Also the market share is not meaningful here since platforms that may enjoy a monopoly position do not necessarily have market power, as we have detailed above. Concrete guidelines on how to establish a market power claim in a two-sided market are currently missing (EVANS & SCHMALENSEE, 2013) and should be evaluated in detail in further studies.

Furthermore, we wish to mention that our results were based on insights on the theoretical economic papers that we deem applicable to the current context, but which by and large had a different context in mind when they were written. In particular, to the best of our knowledge there is a lack of



rigorous empirical analysis on contestability of content markets as well as theoretical investigations on the effect of access regulation vis-à-vis platform competition. Our discussion on access regulation, for example, is thus exclusively based on the paper by SCHIFF (2003), which makes several assumptions that may not hold in practice, such as i) zero costs for providing access ii) quantity competition and iii) lack of multi-homing possibilities. Empirical and theoretical work in this direction seems to be a fruitful avenue for future research. Additionally, further research should explicitly consider the dynamic effects of access regulation in two-sided content markets, the possibility to establish a level playing field by deregulating traditional telcos and, in order to shed more light on debatable issues, conduct data-driven analyses, e.g., regarding the contestability of two-sided content markets.

Finally, it is important to highlight that our assessment may not be taken as a regulatory waiver for OTTs in general. We have restricted attention to access regulation of two-sided content markets and did not consider a complete list of regulatory remedies that may, for example, particularly apply to one-sided OTTs. For instance, communications services, such as Skype or WhatsApp currently do not face interconnection obligations, which may be subject to a separate investigation. It should also be clear that abusive conduct, e.g., through tying or foreclosure, may always be subject to *ex post* regulation.

### References

- ARMSTRONG, M. (2006): "Competition in two-sided markets", *The RAND Journal of Economics*, 37, 668-691.
- ARGENTON, C. & PRÜFER, J. (2012): "Search engine competition with network externalities", *Journal of Competition Law and Economics*, 8, 73-105.
- ARMSTRONG, M. & WRIGHT, J. (2007): "Two-sided markets, competitive bottlenecks and exclusive contracts", *Economic Theory*, 32, 353-380.
- BACACHE, M., BOURREAU, M. & GAUDIN, G. (2014): "Dynamic entry and investment in new infrastructures: Empirical evidence from the fixed broadband industry", *Review of Industrial Organization*, 44, 179-209.
- BAUMOL, W., PANZAR, J. & WILLIG, R. (1982): *Contestable markets and the theory of industry structure*, San Diego: Harcourt Brace Jovanovich.
- BRITO, D., PEREIRAZ, P. & VAREDA, J. (2014): "On the incentives of an integrated ISP to favor its own content", in Proceedings of the 20<sup>th</sup> ITS Biennial Conference, Brasil. Mimeo. <http://hdl.handle.net/10419/106901>.

BROOS, S. & GAUTIER, A. (2015): "Competing One-Way Essential Complements: The Forgotten Side of Net Neutrality", Mimeo. <http://ssrn.com/abstract=2570924>.

BROWN, N. (2014): "An assessment of the proportionality of regulation of over the top communications services under Europe's common regulatory framework for electronic communications networks and services", *Computer Law & Security Review*, 30, 357-374.

CAILLAUD, B. & JULLIEN, B. (2003): "Chicken & egg: Competition among intermediation service providers", *The RAND Journal of Economics*, 34, 309-328.

CAVE, M. (2006): "Encouraging infrastructure competition via the ladder of investment", *Telecommunications Policy*, 30, 223-237.

COX, M., KANELLOPOULOS, H. & STAYKOVA, V. (2015): "Liberty Global/Ziggo: Consolidation and Innovation in Telecoms", *European Commission – Competition merger brief*, 1, 8-14.

DEWENTER, R. & RÖSCH, J. (2014): "Net Neutrality and the Incentives (Not) to Exclude Competitors", Mimeo. <http://hdl.handle.net/10419/102313>.

DOGANOGLU, T., & WRIGHT, J. (2010): "Exclusive dealing with network effects", *International Journal of Industrial Organization*, 28, 145–154.

EDELMAN, B. (forthcoming): "Leveraging Market Power Through Tying and Bundling: Does Google Behave Anti-Competitively?", *Journal of Competition Law and Economics*.

ETNO (2012): ETNO paper on Contribution to WCIT: ITRs Proposal to Address New internet Ecosystem. <https://www.etno.eu/news/etno/2012/51> (last access 06.08.2015).

European Commission (2015): Commission staff working document. "A Digital Single Market Strategy for Europe", Com (2015) 192 final. [http://ec.europa.eu/priorities/digital-single-market/docs/dsm-swd\\_en.pdf](http://ec.europa.eu/priorities/digital-single-market/docs/dsm-swd_en.pdf) (last access 06.08.2015).

EVANS, D.:

- (2008): "The economics of the online advertising industry", *Review of Network Economics*, 7, 359-391.

- (2011): "The Antitrust Economics of Free", *Competition Policy International*, 7 (1).

- (2012): "Two-Sided Market Definition", in *Market Definition in Antitrust Theory and Case Studies* (pp. 437-470), ABA Book Publishing.

EVANS, D. & NOEL, M. (2008): "The analysis of mergers that involve multisided platform businesses", *Journal of Competition Law and Economics*, 4, 663-695.

EVANS, D. & SCHMALENSEE, R.:

- (2007): "Industrial Organization of Markets with Two-Sided Platforms", *Competition Policy International*, 3, 151-179.

- (2013): "The Antitrust Analysis of Multi-Sided Platform Businesses", in R. BLAIR & D. SOKOL (Eds), *Oxford Handbook on International Antitrust Economics* (pp. 404-450), Oxford: Oxford University Press.

FILISTRUCCHI, L. (2008): "A SSNIP test for two-sided markets: some theoretical considerations", Working Paper 08-34 Tilburg University & Università di Siena. [http://www.wiwi.uni-frankfurt.de/profs/blonski/vwl\\_kolloquium/SSNIPin2sidedi.pdf](http://www.wiwi.uni-frankfurt.de/profs/blonski/vwl_kolloquium/SSNIPin2sidedi.pdf)

GABRIEL, S. (2014): "Unsere politischen Konsequenzen aus der Google-Debatte", *Frankfurter Allgemeine* (16.05.), <http://www.faz.net/-hzj-7pe09> (last access 06.08.2015).

GRAJEK, M. & RÖLLER, L. H. (2012): "Regulation and investment in network industries: Evidence from European telecoms", *Journal of Law and Economics*, 55, 189-216.

HAGIU, A.:

- (2004): "Two-sided platforms: Pricing and social efficiency", Discussion Paper 04-E-035, Research Institute of Economy, Trade and Industry.

<http://www.rieti.go.jp/jp/publications/dp/04e035.pdf>

- (2006): "Proprietary vs. Open Two-Sided Platforms and Social Efficiency", Working Paper 07-095, Harvard Business School.

<http://www.hbs.edu/faculty/Publication%20Files/07-095.pdf>.

HAGIU, A. & WRIGHT, J.:

- (2015): "Marketplace or reseller?", *Management Science*, 61, 184-203.

- (forthcoming): "Multi-sided platforms", *International Journal of Industrial Organization*.

HAUCAP, J. & HEIMESHOFF, U. (2014): "Google, Facebook, Amazon, eBay: Is the internet driving competition or market monopolization?", *International Economics and Economic Policy*, 11, 49-61.

HOUCK, S. (2011): "Google, Monopoly and Antitrust 101". [http://www.huffingtonpost.com/stephen-d-houck/google-antitrust-hearings\\_b\\_1000205.html](http://www.huffingtonpost.com/stephen-d-houck/google-antitrust-hearings_b_1000205.html). Huffington Post (10.07) (last access 06.08.2015).

JOSKOW, P. (2007): "Regulation of natural monopoly", *Handbook of law and economics*, 2, 1227-1348.

KRÄMER, J. & SCHNURR, D. (2014): "A unified framework for open access regulation of telecommunications infrastructure: Review of the economic literature and policy guidelines", *Telecommunications Policy*, 38, 1160-1179.

KRÄMER, J., WIEWIORRA, L. & WEINHARDT, C. (2013): "Net neutrality: A progress report", *Telecommunications Policy*, 37, 794-813.

LI, F. & WHALLEY, J. (2002): "Deconstruction of the telecommunications industry: from value chains to value networks", *Telecommunications Policy*, 26, 451-472.

NARDOTTO, M., VALLETTI T. & VERBOVEN F. (2015): "Unbundling the Incumbent: Evidence from UK", *Journal of the European Economic Association*, 13, 330-362.

NEWMAN, N. (2014): "Search, Antitrust and the Economics of the Control of User Data", *Yale Journal on Regulation*, 31, 401-454.

OCELLO, E., SJÖDIN, C. & SUBOCS, A. (2015): "What's Up with Merger Control in the Digital Sector? Lessons from the Facebook/WhatsApp EU merger case", *European Commission – Competition merger brief*, 1, 1-7.

PARKER, G. & VAN ALSTYNE, M. (2005): "Two-sided network effects: A theory of information product design", *Management Science*, 51, 1494-1504.

PEITZ, M., VALLETTI, T. & SCHWEITZER, H. (2014): "Market Definition, Market Power and Regulatory Interaction in Electronic Communications Markets". <http://www.cerre.eu/publications/market-definition-market-power-and-regulatory-interaction-electronic-communications> (last access 06.08.2015).

ROCHET, J. C. & TIROLE, J.:

- (2003): "An economic analysis of the determination of interchange fees in payment card systems", *Review of Network Economics*, 2, 69-79.

- (2006): "Two-sided markets: A progress report", *The RAND Journal of Economics*, 37, 645-667.

RYSMAN, M. (2009): "The economics of two-sided markets", *The Journal of Economic Perspectives*, 23, 125-143.

Sandvine (2014): Sandvine Global internet Phenomena Report 2H 2014. <https://www.sandvine.com/downloads/general/global-internet-phenomena/2014/2h-2014-global-internet-phenomena-report.pdf> (last access 06.08.2015).

SCHIFF, A. (2003): "Open and closed systems of two-sided networks", *Information Economics and Policy*, 15, 425-442.

SCHMALENSEE, R. (2000): "Antitrust issues in Schumpeterian industries", *The American Economic Review*, 90, 192-196.

SUN, M. & TSE, E. (2009): "The Resource-Based View of Competitive Advantage in Two-Sided Markets", *Journal of Management Studies*, 46, 45-64.

THOMAS, D. (2015): "Brussels plans to shake up telecoms market", *Financial Times* (19.04). <http://www.ft.com/intl/cms/s/0/bb6c215a-e50e-11e4-8b61-00144feab7de.html#axzz3gY2Fh51K> (last access 06.08.2015).

TOURÉ, H. (2012): "Speech by ITU Secretary-General, Dr Hamadoun Touré – Public Briefing Session on WCIT-12: Opening Remarks". <http://www.itu.int/en/osg/speeches/Pages/2012-10-09.aspx> (last access 06.08.2015).

VERDIER, M. (2013): "One Sided Access in Two-Sided Markets", Mimeo. <http://ssrn.com/abstract=2209379>.